Deicing Salt Injury to Plants

by Dr. Bal Rao, Davey Technical Journal

During winter months sensitive plants get injured from the application of deicing salt on roads, sidewalks and parking lot areas. Most deicing salt is unrefined rock salt containing about 98.5 percent sodium chloride, 1.2 percent calcium sulfate, 0.1 percent magnesium chloride and 0.2 percent rock. In some cases, 0.02 percent sodium ferrocyanate may be used as a anticaking agent.

HOW SALT INJURES PLANTS

Excessive amounts of salt in soil near the root system can cause injury to plants. Often salt accumulates from plowing salt containing snow or drift onto the plants. Rock salt prevents much of the moisture in soil from entering roots and can result in a drought-like environment for plants even when there is plenty of soil moisture. This is called physiological drought and may appear as leaf scorch.

When salt dissolves in water, sodium and chloride ions separate and the chloride ions are absorbed by the roots and translocated upward to leaf margins and shoot tips where they can accumulate in toxic levels. This also causes scorching symptoms on leaves. Excess sodium causes soil to lose its capacity to aggregate into clumps and become compacted. Excess sodium also lowers the availability of potassium resulting in potassium deficiency in salt injured plants.

Dr. Hudler from Cornell University reported that salt splash from passing cars and trucks may enter plant cells directly and, as a result, some species can lose cold hardiness and are likely to be killed by freezing. Damage is more evident of the downside of the highway, and branches above the spray-drift zone are not injured or are injured less.

SALT INJURY SYMPTOMS

Salt injury symptoms resemble those caused by drought or root injury. Stunted and yellowed foliage, premature autumn leaf coloration, death or leaf margins (scorch) and twig dieback. On deciduous plants, these symptoms may not be visible until mid-summer.

Needles on affected conifer plants turn yellow or brown in early spring. Browning usually begins at the needle tips and on the side facing the road. Symptoms begin to show up in late February or early March, becoming more extensive through spring and summer. Investigations conducted at the University of Guelph, Guelph, Ontario, indicated that increased amounts of wax or bloomon spruce needles seem to add some protection; the bluer the spruce, the more resistance it has to salt spray. Deciduous shrubs and trees with buds submerged in the twig or with resinous buds are resistant.

If spray is the primary means of salt deposit, discolored needles are soon masked by the near year's growth. However, if salt is also excessive in the soil, the new needles may also show symptoms from chloride ion toxicity.

HOW TO PREVENT OR MINIMIZE SALT INJURY

Although not using salt would help plants, the safety to the public during winter months would not stop this practice. Calcium chloride is reported to be less toxic than sodium chloride, but it is very expensive (eight times). In addition, serious problems with the handling and storing of calcium chloride limits its use by road maintenance personnel. It absorbs moisture and cakes more readily than sodium chloride. Where possible, applications of sand, light gravel or cinders provide adequate results. Sensitive plants can be protected by installing barriers such as burlap or wooden snow fences. Salt application after March 1 is very detrimental to plants and shrubs and should be kept to a minimum. Amending soil with gypsum or activated charcoal helps maintain soil aggregate, improving drainage and minimizing salt accumulation. However, to be effective, these should be there closer to salt application and they require large amounts of material applied over several years. Avoid piling salt contained snow around plants. Where feasible affected areas should be leached with water to remove salt.

Plant salt-tolerant plants in an area where salt problems are likely to occur. Tolerance varies with many factors, including exposure, soil texture and plant age, so use the following list only as a guide.

Low Tolerance

Glossy abelia	Chinese holly
Balsam fir	Black walnut
Red maple	Common privet
Sugar maple	Tulip tree
Smooth alder	Hona crab apple
American hornbeam	Norway spruce
Shagbark hickory	Red pine
Hackberry	White pine
American redbud	Douglas fir
Red Osier dogwood	Rose
Yellow-twig dogwood	European red elder
	American linden
Hawthorn	Eastern hemlock

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Relative tolerance to highway deicing salt:

High Tolerance	
Norway maple	**Mulberry**
Horse chestnut	**Virginia creeper**
Tree of heaven	**White spruce**
Yellow birch	**Colorado blue**
cherry birch	**spruce**
Paper birch	**Mugo pine**
Gray birch	**Austrian pipe**
Siberian pea tree	**Ponderosa pine**
Russian olive	**White poplar**
White ash	**Balsam poplar**
Honeylocust	**Cottonwood**
Sea buckthorn	**Big tooth aspen**
European larch	**Lombardy poplar**
Japanese larch	**Trembling aspen**
Zabel's honeysuckle	**Jackman's potentilla**
European fly	**White oak**
honeysuckle	**Bur oak**
Red oak	**Japanese boxwood**
Alpine currant	**Catalpa**
Black locust	**Green ash**
Common osier	**Red cedar**
Buffaloberry	**Glossy privet**
Mountain ash	**Scotch pine**

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On December 20th, 1993 Turf Products Ltd. hosted a Christmas party at The Danada House in Wheaton to share appreciation with its customers and friends for 25 successful years in business.

Cecil Kerr, John Turner, Don Maskey, Wally Fuchs, and Buzz Lewis.

John Lebedevs, Mike Conley, Bonnie Fuchs, Wally Fuchs, Janice Dedard, Trent Bradford and Maurine Dempsey.